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SPECIFICATION FOR EQUIPMENT FOR ENVIRONMENTAL TESTS FOR ELECTRONIC AND ELECTRICAL ITEMS

PART 12 SALT MIST/FINE MIST CHAMBER

(First Reprint JULY 1990)

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SPECIFICATION FOR EQUIPMENT FOR ENVIRONMENTAL TESTS FOR ELECTRONIC AND ELECTRICAL ITEMS

PART 12 SALT MIST/FINE MIST CHAMBER

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SPECIFICATION FOR EQUIPMENT FOR ENVIRONMENTAL TESTS FOR ELECTRONIC AND ELECTRICAL ITEMS

PART 12 SALT MIST/FINE MIST CHAMBER

0. FOREWORD

0.1 This Indian Standard (Part 12) was adopted by the Indian Standards Institution on 21 October 1986, after the draft finalized by the Environmental Testing Procedures Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 The object of this standard (Part 12) is primarily to guide the environmental equipment manufacturers with respect to broad specifications for their equipment and to assist the users of such equipment to properly define their requirements in the indent of the equipment. The requirements of the equipment largely depends on the environmental conditions to be simulated or created.

0.3 Certain requirements have been specified in a general form in view of practical difficulties in defining such requirements quantitatively. It is presumed, that with the experience gained, more precise requirements will be laid down for such equipment.

0.4 An overall performance assessment of the complete equipment for a short duration has been included although it may be realised that it may not be entirely sufficient. This will at least ensure the functional performance and operatability of the equipment. Many of the constructional requirements specified can be checked through visual examination.

0.5 In view of the subjective nature of some of the requirements, sufficient care shall be taken in using the standard.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded

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*Rules for rounding off numerical values (*revised*).

off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part 12) lays down guiding requirements for the design of salt mist and fine mist chambers required for carrying out salt mist and fine mist tests according to IS : 9000 (Part 11)-1983* and IS : 9000 (Part 22)-1983† respectively.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions and explanation of terms given in IS : 9000 (Part 1)-1977‡ shall apply.

3. TEST CHAMBER

3.1 Salt Mist Chamber

3.1.1 A typical chamber for salt mist and fine mist test is shown in Fig. 1.

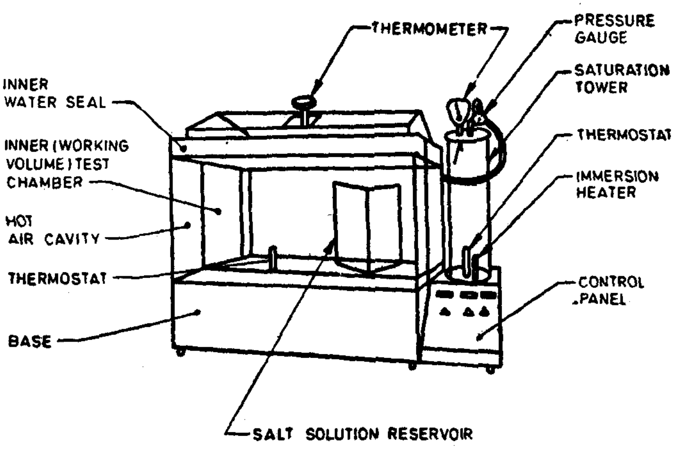

Fig. 1 Typical Salt Mist/Fine Mist Chamber

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*Basic environmental testing procedures for electronic and electrical items: Part 11 Salt mist test

†Basic environmental testing procedures for electronic and electrical items: Part 22 Fine mist test.

‡Basic environmental testing procedures for electronic and electrical items: Part 1 General.

3.1.2 The chamber for these tests shall be constructed of such material that will not be influenced by the corrosive effects of the salt mist.

3.1.3 The chamber shall be so constructed that the spray produced does not impinge directly on the items under test.

3.1.4 The chamber shall be capable of maintaining a temperature up to 50 ± 2°C over the specified period for carrying out salt mist test according to IS : 9000 (Part 11)-1983*.

3.1.5 The chamber used for this test shall include an exposure chamber with racks for supporting the test items, salt solution reservior with means for maintaining an adequate level of solution, means for atomization of the salt solution including suitable nozzles and compressed air supply, chamber-heating means and control and means for humidifying the air used for atomization at a temperature above the chamber test temperature.

3.1.6 The chamber and all its accessories shall be made of such materials that they themselves are not affected by the salt laden atmosphere or do not give rise to electrolytic corrosion when in contact with each other or the items under test.

3.1.7 The salt laden atmosphere shall freely circulate around the item under test. The chamber and all its accessories shall be so constructed and arranged that there is no direct impingement of the salt fog or dripping of the condensate on the item under test. The liquid which has come in contact with the item under test shall not be allowed to return to the salt solution reservoir.

3.1.8 The chamber shall be properly vented to prevent pressure build up inside the chamber. The discharge end of the vent shall be protected from strong draft which may create strong air currents inside the chamber.

3.1.9 The working space of the chamber where the test items are exposed for the test shall be capable of being maintained, if required, at a temperature of 35°C. Satisfactory methods for controlling the temperature accurately are by housing the chamber in a properly controlled constant temperature room, by thoroughly insulating the chamber and preheating the air to the proper temperature prior to atomization or by jacketing the chamber and controlling the temperature of the water or air used in the jacket. The use of immersion heaters within the chamber for the purpose of maintaining the temperature within the exposure zone is prohibited.

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*Basic environmental testing procedures for electronic and electrical items: Part 11 Salt mist test.

3.1.10 The atomizers used shall be of such design and construction as to produce a finely divided wet and dense fog. Atomizing nozzles shall be made of materials that are non-reactive to the salt solution.

NOTE 1 — Suitable atomization may be obtained in chambers having a volume of less than 0·34 cubic metres under the following conditions:

a) Nozzle orifices between 0·51 mm and 0·76 mm in diameter,

b) Atomization of approximately 10 litres of salt solution per m^3 of chamber volume per 24 hours, and

c) Nozzle pressure as low as practicable to produce the fog at the required rate.

NOTE 2 — When using large size chambers having a volume considerably in excess of 0·34 cubic metres, these conditions may require modification to meet the requirements for operating conditions.

3.1.11 The conditions maintained at all parts of the working space of the chamber shall be such that a clean fog-collecting receptacle placed at any point will collect from 0·5 to 3 ml of solution per hour for each 80 square centimetres of horizontal collecting area (10 cm diameter) based on an average test of at least 16 h. The receptacle shall be placed in such a manner that it is not shielded by test items and no drops of solution from test items and other sources are collected in it.

3.1.12 The compressed air entering the atomizer shall be essentially free from all impurities, such as oil and dirt. Fort this purpose, an air filter fabricated from a non-corrosive material shall be provided in the air supply line. A rolled glass wool cloth and a glass diaphragm shall be suitably placed in the filter. Means shall be provided to humidify and warm the compressed air as required to meet the operating conditions. To ensure against clogging the atomizers by salt deposition, the air should have a relative humidity of at least 85 percent at the point of release from the nozzle. A satisfactory method is to pass the air in very fine bubbless through a tower containing heated water which should be automatically maintained at a constant level. The temperature of the water should be at least 35°C. The permissible water temperature increases with increasing volume of air and with decreasing insulation of the chamber and the chamber's surroundings. However, the temperature should not exceed a value above which an excess of moisture is introduced into the chamber (for example, 43°C at an air pressure of 85 kPa or a value which makes it impossible to meet the requirements for operating temperature).

3.2 Fine Mist Chamber — The test chamber used for salt mist test shall be capable of being used for fine mist test also according to IS : 9000 (Part 22)-1983*. Fine mist of water may be generated by directing an air jet across the top of a fine jet connected to a pipe, immersed in or connected to a water supply.

3.2.1 Alternately, an enclosure of adequate size having facilities for producing fine mist of tap water under laboratory atmospheric conditions may be used.

4. CONSTRUCTION, WORKMANSHIP AND FINISH

4.1 General

4.1.1 The interior of the chamber should be fabricated preferably with welded stainless steel (or any other non-corrosive material) of sufficient thickness provide necessary mechanical strength, and should be coated with anti-corrosive rubberized paint. Corners and seams of the interior liners should be so welded as to allow for expansion and contraction under all temperature changes to prevent distortion and damage.

4.1.2 The chamber shall be so constructed as to have the following provisions:

a) The chamber shall have the facility to drain out the sprayed solution which shall not be reused; and

b) A trap should be fitted on drain pipe to prevent entry of atmospheric air and also to prevent escape of salt mist during salt spray.

4.2 Working Volume — The working volume of the chamber should be chosen from the following *preferred* values, unless otherwise specified:

0·5 m^3	(1·25 × 0·65 × 0·65 m)
1·0 m^3	(1·20 × 0·90 × 0·90 m)
2·5 m^3	(2·25 × 1·10 × 1·00 m)

NOTE — Due to peculiarities of the salt mist test conditions, supplier's recommendations for other suitable volumes may be considered.

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*Basic environmental testing procedures for electronic and electrical items: Part 22 Fine mist test.

4.3 Insulation — The chamber shall be suitably and sufficiently insulated for the temperature range involved. The insulation shall be such as to ensure that the surface external to chamber does not attain excessive temperature.

NOTE — The maximum permissible external temperature has to be specified by the purchaser.

4.4 Doors — A top opening door, preferably, shall be capable of full opening to ensure full access to the working space. It shall be fitted with suitable gaskets to prevent leakage of salt mist and heat losses.

4.5 Viewing Window — A viewing window of the required dimensions shall be provided on the door, preferably of the multipane type, hermetically sealed.

4.6 Shelves — Removable, perforated shelves capable of supporting, without distortion items of specified mass shall be provided. The number of shelves and adjustable heights should be as specified.

4.7 Interior Light — Provision shall be made for illuminating the working space by incandescent lamps fitted either inside or outside the chamber. The lamps may be recessed so as not to project into the working space. Provision shall also be made for prevention of condensation of moisture on the lamps.

4.8 Salt Solution Container — The salt solution container shall be made of suitable materials which does not craze and is unaffected by any of the salt solution listed in IS : 9 000 (Part 11)-1983*. The design shall be such that the container can be easily cleaned. The capacity may be according to the volume of the chamber.

4.9 Workmanship — The workmanship shall be of good current engineering practice.

4.10 Finish — The external and internal finish of the chamber shall be as specified for parts and not otherwise covered so as to ensure protection against corrosion and other similar effects.

4.11 Miscellaneous

4.11.1 The chamber shall be designed for optimum performance and economic continuous operation with minimum maintenance requirement. It shall occupy minimum floor area.

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*Basic environmental testing procedures for electronic and electrical items: Part 11 Salt mist test.

4.11.2 All components and parts should conform to relevant Indian Standards, wherever applicable.

4.11.3 Provision of castor wheels shall be made for easy movability of the chamber, if required.

5. INSTRUMENT CONSOLE

5.1 An instrument console consisting of required instruments should preferably be fitted to the chamber for case of operation. This instrument console should include, *inter alia*, the following:

a) Indicating panel consisting of mains on-off switch, mains-on indicator lamp, temperature indicator, on-off switch;

b) Necessary instruments for controlling and recording of temperature; temperature control stability shall be within ± 0·5°C.

c) Input regulation to ensure close temperature accuracy and for adjusting, regulating or varying heating capacities from 0 to 100 percent; and

d) Provision for controlling and indicating air pressure.

5.2 Provision for cooling the inlet air, wherever the ambient temperature is above 35°C may be made by suitable means or by use of refrigeration system.

6. POWER SUPPLY REQUIREMENTS

6.1 The test equipment shall be capable of operating at 240 V ± 10 percent ac single phase, 50 Hz or 415 V ± 10 percent three phase 50 Hz. Total power supply input shall be declared by the manufacturer as required by the purchaser.

7. SAFETY

7.1 Adequate electrical safety arrangements shall be incorporated in the chamber design to avoid electric shock to the operator and damage to the chamber.

7.2 The safety protection should be as follows:

a) Protection against supply voltage variation;

b) Safety output for high temperature;

c) Adequate heat/electrical insulation at control panel;

d) Safety alarms (visual and/or audio) in case of chamber malfunctioning; and

e) Provision of single phasing protection as well as phase reversal protection.

8. MARKING

8.1 The chamber shall be marked with the following information:

a) Manufacturer's name or trade-mark;

b) Type designation;

c) Working volume and range of operating conditions;

d) Power supply requirements; and

e) Any other additional marking as required.

8.1.1 The chamber may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.

9. TESTS

9.1 Each chamber shall be subjected to the following tests:

a) Visual examination and inspection (**9.2**); and

b) Performance test (**9.3**).

9.2 Visual Examination — Each chamber shall be visually examined and inspected for compliance with the relevant requirements of the standard.

9.3 Performance — The chamber shall be operated for salt mist test for a minimum period of 16 h continuously. The observed chamber performance should meet the specified requirements.

10. INSTRUCTION MANUAL

10.1 Each chamber shall be provided with the instruction manual which shall contain the following:

a) Operating instructions;

b) Maintenance and service instructions;

c) Schematic diagrams, actual circuit diagrams and layout design;

d) List of component parts; and

e) List of spare parts.

11. INFORMATION TO BE FURNISHED BY THE INDENTOR

11.1 The following information shall be furnished by the indentor:

a) Temperature range of the chamber (*see* **3.1.4**);

b) Maximum permissible external surface temperature (*see* **4.3**);

c) Number of shelves and adjustable height (*see* **4.6**);

d) Dimensions of viewing window (*see* **4.5**);

e) External and internal finish (*see* **4.10**);

f) Provision of castor wheels (*see* **4.11.3**);

g) Total power supply input (*see* **6.1**);

h) Safety protection (*see* **7.2**);

j) Working space and total internal volume (*see* **4.2**); and

k) Any other characteristics or parameters with tolerances.